

## CORRESPONDENCE/MEMORANDUM

→ US EPA Region V

DATE: February 19, 1999

File Code: 4530

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PRELIMINARY STACK TEST REVIEW

By: Jeannine Campion Test Date: Nov 24, 1998

Name of Source: Rockwell Lime FID #: 4360-034-390

Address: 4110 Rockwood Rd Stack #: S11

City: Manitowoc, WI Process #: P36

Permit #: 93-RV-108 Date Issued: FEB 7, 1995

Description of Source Tested: Lime Kiln

Description of Control Equipment: Baghouse

Test Firm: Environmental Monitoring + Technologies

Crew Chief &amp; Phone#: 0

Pollutant Tested: Particulates Test Method: 5/202

Pollutant Tested: SO<sub>2</sub> Test Method: 19

Pollutant Tested: Opacity Test Method: CEM

Test Production Level: 24.5 tons/hr Stone feed

Rated Production Level: 2.5 tons/hr Stone feed

Discussion of Results:Poll. Test Ave. = 0.41 lb/ton stone Limit = 0.60 lb/ton stone In Compliance?  Y  NPoll. Test Ave. = 1.92 lb/MMBTU Limit = 5.5 lbs/MMBTU In Compliance?  Y  NPoll. Test Ave. = 1.99% Limit = 2.1% SUPER In Compliance?  Y  NPoll. Test Ave. = 0% Limit = 10% In Compliance?  Y  NIs This a Valid Test?  Y  N If answer is no, please indicate the reason.

\* Test may be reviewed in depth later, if necessary.

CC Joe Perez - AM/7  
US EPA Region VAnum 049  
3-31-99  
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PARTICULATE CHECKLIST

Name of Source: Rockwell Lime Test Date: NOV 24, 1998

1. Are the isokinetics per run between 90 and 110%? YES  NO   
If the %I for a run is outside the range, void the run. See 5.
2. Is the sample volume per run  $\geq$  30 DSCF? YES  NO   
If the sample volume for a run is  $<$  30 DSCF, void the run. See 5.
3. Is the sample time per run  $\geq$  60 min.? YES  NO   
If the sample time for a run is  $<$  60 min., void the run. See 5.
4. Is the sample time per sample point  $\geq$  two min.? YES  NO   
If the sample time per point for a run is  $<$  two min., void the run. See 5.
5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES  NO   
If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.
6. Is the total particulate per run added correctly? YES  NO   
If an incorrect total is found, correct the total and the results or call the consultant and ask for a correction.
7. Was the backhalf included in the total particulate? YES  NO   
NSPS sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5.

Eq. 1 Gr/DSCF =  $15.43 * \text{g of part./sample volume of run in DSCF}$

Eq. 2 Gr/DSCF @ 12% CO<sub>2</sub> = (Gr/DSCF) \* 12 / Stack CO<sub>2</sub>

Eq. 3 Gr/DSCF @ 7% O<sub>2</sub> = (Gr/DSCF) \* (20.9 - 7) / (20.9 - Stack O<sub>2</sub>)

Eq. 4 Lb/DSCF = (Gr/DSCF) / 7000 Eq. 5 Lb/MLb<sub>DRY</sub> =  $385.6 * 10^3 * (\text{Lb/DSCF}) / \text{MW}_{\text{DRY}}$

Eq. 6 Lb/MLb<sub>WET</sub> =  $385.6 * 10^3 * (\text{Lb/DSCF}) * (1 - (\% \text{ Moisture}/100)) / \text{MW}_{\text{WET}}$

Eq. 7 Lb/Hr =  $60 * \text{DSCFM} * (\text{Lb/DSCF})$  Eq. 8 Lb/ $10^6$  BTU =  $(\text{Lb/Hr}) / (10^6 \text{ BTU/Hr})$

Eq. 9 Lb/ $10^6$  BTU =  $(\text{Lb/DSCF}) * \text{F Factor} * 20.9 / (20.9 - \text{Stack O}_2)$

8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/MLb, Lb/Hr or Lb/ $10^6$  BTU, solve the needed Eq. Do your results match the consultant's? YES  NO   
If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES  NO   
If no, write in the correct average.

10. Is the average result in compliance? YES  NO   
If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? YES  NO   
If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

98%



CASEOUS TEST CHECKLISTName of Source: Rockwell Lime Gas Tested: SO<sub>2</sub> Test Date: Nov 24, 1998

1. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

YES  NO 

Eq. 1 PPM<sub>DRY</sub> = PPM<sub>WET</sub>/(1-% Moisture as Decimal)

Eq. 2 PPM<sub>DRY@ 7% O<sub>2</sub></sub> = PPM<sub>DRY</sub>\*(20.9-7)/(20.9-Stack O<sub>2</sub>)

Eq. 3 PPM<sub>DRY@ 12% CO<sub>2</sub></sub> = PPM<sub>DRY</sub>\*12/Stack CO<sub>2</sub>

2. If the limit is in PPM<sub>DRY</sub> or in PPM<sub>DRY</sub> corrected to a certain O<sub>2</sub> or CO<sub>2</sub> value, solve Eq. 1-3. Do your results match the consultant's? YES  NO  N/A  
If no, fix the problem or call the consultant for a correction.

Eq. 4 mg/DSCM = PPM<sub>DRY</sub>\*Molecular Weight of Gas/24.06

Eq. 5 Lb/DSCF = 2.595\*10<sup>-9</sup>\*PPM<sub>DRY</sub>\*Molecular Weight of Gas

Eq. 6 Lb/DSCF = 6.243\*10<sup>-8</sup>\*(mg/DSCM)

Eq. 7 Lb/Hr = 60\*DSCFM\*(Lb/DSCF) Eq. 8 Lb/10<sup>6</sup> BTU = (Lb/Hr)/(10<sup>6</sup> BTU/Hr)

Eq. 9 Lb/10<sup>6</sup> BTU = (Lb/DSCF)\*F Factor\*20.9/(20.9-Stack O<sub>2</sub>)

3. If the limit is in mg/DSCM, Lb/DSCF, Lb/Hr, or Lb/10<sup>6</sup> BTU, solve the needed Eq. Eq. 1-3 may also be needed. Do your results match the consultant's?

If no, fix the problem or call the consultant for a correction.

YES  NO 

fixed

Eq. 10 % Capture Eff. = (Lb VOC/Hr to Control Equip.)\*100  
(Lb VOC/Hr Input to Process)

Eq. 11 % Destruction Eff. = (Inlet Lb VOC/Hr - Outlet Lb VOC/Hr)\*100  
(Inlet Lb VOC/Hr)

Eq. 12 % Overall Eff. = (% Cap. Eff./100)\*(% Dest. Eff./100)\*100

4. If the limit is in terms of % Capture Eff., % Dest. Eff., or % Overall Eff., solve the needed Eq. Eq. 1-9 may also be needed. Do your results match the consultant's?  
If no, fix the problem or call the consultant for a correction.

YES  NO  N/A

5. Is the three run(or two run) average correct?  
If no, write in the correct average.

YES  NO 

6. Is the average result in compliance?  
If no, the District should issue an NOV.

YES  NO 

7. Was the source operating at a level representative of full capacity?  
If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

YES  NO 

98%



Rockwell Lime

24-Nov-98

**Lime Kiln Exhaust**  
**Method 5/202 - Particulates**

Run: 1      Run: 2      Run: 3

Barometric Pressure (PB):	29.8	29.8	29.8	Inches Hg
Stack Static Pressure:	-0.21	-0.22	-0.22	Inches H2O
Stack Pressure (PS):	29.78	29.78	29.78	Inches Hg
Orifice Pressure (OP) or delta H:	1.28	2.38	2.47	Inches Hg Abs.
Volume H2O CONDENSED (VLc):	30	42	46	mL condensed
Volume H2O in SILICA GEL (VLsg):	11	13	14	mL in silica gel
Total Volume H2O in impingers (VL):	41	55	60	mL total
Total particulate mass (MT):	0.1133	0.0585	0.052	Grams
Test Time (T):	60	60	60	Minutes
Number of Points:	24	24	24	Points
Time per point:	2.5	2.5	2.5	Minutes
% O2:	15	13.8	14	%
% CO2:	13.5	13	13	%
% N2:	71.5	73.2	73	%
Pitot tube coefficient (CP):	0.84	0.84	0.84	(dimensionless)
Stack Temperature Avg. (TS):	323	374	371	Deg. F
Stack Temperature (TS): Rankine	782	834	831	Deg. R
Meter Temperature Avg. (TM):	83	83	54	Deg. F
Meter Temperature (TM): Rankine	543	543	513	Deg.R
Gas Meter Volume (VM):	33.75	48.89	46.97	Cubic Feet
Nozzle Diameter:	0.28	0.325	0.325	Inches
Nozzle Area (AN):	4.28E-04	5.76E-04	5.76E-04	Square Feet
Stack Area (AS):	27.49	27.49	27.49	Square Feet
Dry Gas Meter correction factor (Y):	0.9969	0.9969	0.9969	(dimensionless)
F-factor:				DSCF/10^6 BTU
Sqr Rt Velocity Pressure Avg (VP^.5):	0.55	0.56	0.57	Inches H2O
Heat Input (H):	81.53	84.36	81.6	MMBTU/Hr

Dry Gas Meter Volume (VMSTD):	32.7	47.4	48.2	Dry Standard Cubic Feet
Condensed H2O Volume (VVSTD):	1.931	2.590	2.825	Wet Standard Cubic Feet
% Moisture:	5.6	5.2	5.5	%
Mole Fraction (MD):	0.944	0.948	0.945	Fraction
Dry Molecular Weight (MWD):	30.8	30.6	30.6	Lb/Lb-mole dry stack gas
Wet Molecular Weight (MWS):	30.0	30.0	29.9	Lb/Lb-mole wet stack gas
Stack Gas Velocity Avg (VS):	37.1	38.5	39.4	Feet/Second
Actual Stack Flow Rate (QACT):	61269	63555	65065	ACF/M
Dry Stack Flow Rate (QSTD):	38841	37952	38849	DSCF/M
% Excess Air	387	250	266	%
Part. Mass Rate-Areas Method(PMRA):	16.06	6.16	5.47	Lbs/Hr
Part. Mass Rate-Conc. Method (PMRC):	17.82	6.19	5.54	Lbs/Hr
Part. Mass Rate-Average (PMRAVG):	16.94	6.17	5.51	Lbs/Hr
Part. Emission Concentration (C):	0.0535	0.0190	0.0166	GR/DSCF
Dry Stack Gas Mass Flow Rate (DGR):	185911	180902	185223	Ibs. of dry gas/hr
Emission Rate Avg-dry gas (LB/MLBD):	0.091	0.034	0.030	lb/10^3 lb of dry gas
Wet Stack Gas Mass Flow Rate (WGR):	181720	177151	181107	Ib of wet gas/hr
Emission Rate Avg-wet gas (LB/MLBW):	0.093	0.035	0.030	lb/10^3 of wet gas
% Isokinetics (90% < Iso < 110%)	90.1	99.4	98.7	%



**Method 5/202 - Particulates****Checklist**

Run: 1      Run: 2      Run: 3

Production Data		
Process ID	93-RV-108	27/95
Batch or Run Number	6.000	LB/TON STONE FEED
Run time (min)	23.73	24.6
Run time (min)	24.47	tons/hr stone feed

**Compliance determination for PM:**

Run #1: 0.74 lb PM/ton stone feed

Run #2: 0.25 lb PM/ton stone feed

Run #3: 0.23 lb PM/ton stone feed

Average: 0.41 lb PM/ton stone feed



EL5b =

$$\frac{(4914 \times 101) + (2940 \times 12404)}{5986(4914 \times 12404) + (2101 \times 20402)} = \text{Run } \#$$

282 =

$$\frac{(101 \times 137) + (2101 \times 20402)}{5986(101 \times 137) + (2101 \times 20402)} = \text{Run } \#$$

285b = 0.022

$$\frac{(19900 \times 12404) + (101 \times 101)}{5986(19900 \times 12404) + 101(2101 \times 20402)} = \text{Run } \#$$

16. Weighed Fafnia  
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# Calculation of F-factor AND

16 SO<sub>2</sub>/MMBTU

## 1. F-factor

$$= 10^6 [3.64 \text{ H}_2 + 1.53 \text{ C} + 0.57 \text{ S} + 0.14 \text{ N} - 0.46 \text{ O}_2]$$

HHV

$$= 10^6 [3.64(3.95) + 1.53(70.89) + 0.57(1.99) + .14(1.37) - .46(3.91)]$$

$$= \frac{10^6 [122.37]}{12,404} = \underline{\underline{9865}}$$

## 2. LB SO<sub>2</sub>/MMBTU Using Weighted F-factor

$$= \frac{16}{\text{dsccf}} (F) \left( \frac{20.9}{20.9 - 0.2} \right)$$

$$\text{run } \#1 = \frac{145.06 \text{ lb}}{\text{hr}} \left| \begin{array}{c} \text{hr} \\ \text{233146.94} \end{array} \right| \frac{9532}{9865} \left| \begin{array}{c} 20.9 \\ 20.9 - 15 \end{array} \right\rangle = 2.174$$

$$\text{run } \#2 = \frac{140.416 \text{ lb}}{\text{hr}} \left| \begin{array}{c} \text{hr} \\ \text{2278168} \end{array} \right| \frac{9532}{9865} \left| \begin{array}{c} 20.9 \\ 20.9 - 13.8 \end{array} \right\rangle = 1.753$$

$$\text{run } \#3 = \frac{152.9816 \text{ lb}}{\text{hr}} \left| \begin{array}{c} \text{hr} \\ \text{2332093} \end{array} \right| \frac{9573}{9865} \left| \begin{array}{c} 20.9 \\ 20.9 - 14 \end{array} \right\rangle = 1.960$$

1.97 16 SO<sub>2</sub>  
MMBTU



## EMT Report 98-530

**SUMMARY TABLE #1 - LIME KILN EXHAUST RESULTS - REVISED**

**COMPANY:** Rockwell Lime Company  
**LOCATION:** Manitowoc, WI (Rockwood)  
**SOURCE:** Lime Kiln Exhaust  
**TEST DATE:** 11-24-98

TEST RUN	1	2	3	AVERAGE
<b>GAS PARAMETERS</b>				
Velocity (ft/sec)	37.2	38.5	39.5	38.4
Volume flow (acfmin)	61286.4	63570.6	65084.7	63313.9
Volume flow (scfm, wb)	2469353.3	2402567.1	2468783.9	2446901.4
Volume flow (dscfm)	2331469.4	2278168.0	2332093.0	2313910.1
Temperature (deg. F)	322.7	374.4	371.4	356.2
Oxygen (%)	15.0	13.8	14.0	14.3
Carbon Dioxide (%)	13.5	13.0	13.0	13.2
Moisture (% by volume)	5.6	5.2	5.5	5.4
<b>PARTICULATE SAMPLE</b>				
Sample Volume (dscf)	32.647	47.430	48.203	
Isokinetic	90.1	99.4	98.7	
Mass Collected (mg)	113.3	58.5	52.0	
Concentration (gr/dscf)	0.05355	0.01903	0.01665	0.02974
Emission rate (lb/hr)	17.84	6.20	5.55	9.86
Emission Rate, lb/Ton Stone Feed	0.75	0.25	0.23	0.41
<b>SO2 RESULTS</b>				
SO2 conc (ppm)	379.7	369.7	394.5	381.3
Emission rate (lb/hr)	145.06	140.04	152.98	146.03
Emission rate (lb/MMBTU)	1.779	1.660	1.875	1.77
<b>PROCESS DATA</b>				
Heat Input (MMBTU/hr)	81.53	84.36	81.60	82.50
Stone Feed (Tons/hr)	23.73	24.6	24.47	24.27

**OPACITY RESULTS**

The Opacity CEM read "0" throughout the entire test period.

Strip chart attached to this report by Rockwell Lime Company, prior to submittal to WDNR.

\* USE T-factors



## Environmental Monitoring &amp; Technologies, Inc.

## SUMMARY TABLE #2 - PROCESS DATA / SUPPLEMENTARY RESULTS - REVISED

Company: Rockwell Lime Company

Location: Manitowoc, WI

Source: Lime Kiln Exhaust

Run #: 1-3

Date: 11-24-98

## Manufacturing Data Compiled During EMT's Stack Test on #2 Kiln

Test Run	Time	Natural Gas	Coal/Coke Blend	Stone Feed	Baghouse Pressure Differential Readings Across Each Compartment							
		(CF)	(Lbs)	(Tons)	#1	#2	#3	#4	#5	#6	#7	#8
#1	1009 - 1109	19,900	4,949	23.73	2.6	2.4	2.4	2.4	2.5	2.3	2.5	2.5
#2	1203 - 1303	20,400	5,137	24.60	2.7	2.5	2.4	2.4	2.1	2.1	2.2	2.6
#3	1344 - 1444	20,400	4,914	24.47	2.1	2.2	2.2	2.2	2.0	2.1	2.2	2.2

Fuel Data	Natural Gas	Coal/Coke Blend
Blu Value / CF or Lb	1,012	12,404
% Sulfur / CF or LB	2.90E-05	1.99

$$\text{Total Heat Input MMBTU/hr} = ((\text{Nat. Gas CF} \times \text{BTU Value}) + (\text{Coal/Coke Blend Lbs} \times \text{BTU Value})) \div 1e06$$

$$\text{SO}_2 \text{ lb/MMBTU} = \text{SO}_2 \text{ lb/hr} \div \text{MMBTU/hr}$$

$$\text{Particulate lb/Ton Stone Feed} = \text{Particulate lb/hr} \div \text{Ton Stone Feed/hr}$$

Test Run	Heat Input (MMBTU/hr)	SO2 (lb/hr)	SO2 (lb/MMBTU)	Stone Feed (Tons/hr)	Particulates (lb/hr)	Particulates (lb/Ton Stone Feed)
#1	81.53	145.06	1.779	23.73	17.84	0.75
#2	84.36	140.04	1.660	24.60	6.20	0.25
#3	81.60	152.98	1.875	24.47	5.55	0.23



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# Environmental Monitoring & Technologies, Inc.

EPA Methods 2-5 Moisture, Flow & Particulate Calculation Summary

Company Rockwell Lime  
 Location Manitowoc, WI  
 Source Lime Kiln Baghouse Outlet  
 Run # 1  
 Date 11-24-98

Barometric (Pbar)	29.80 in.Hg	Static Pressure (Pg)	-0.21 in.H2O
Meter Y Factor (Y)	0.9969	Volume Measured (Vm)	33.750 cubic ft.
Stack Area (As)	27.494 sq. ft.	Square Root delta P	0.5532 in.H2O
Oxygen	15.0 %	Δ H	1.28 in.H2O
Carbon Dioxide	13.5 %	Gas Temperature (Ts)	322.7 °F
Impinger Condensate (Wi)	30 mL	Meter Temp. (Tm)	83.5 °F
Silica Gel Gain (Ws)	11 g	CPM Inorganic Mass (Mi)	52.7 mg
Front ½ Particulate (Mf)	49.6 mg	CPM Organic Mass (Mo)	11.0 mg
Run Time	60 minutes	Nozzle Diameter (Dn)	0.280 inches

GAS SAMPLE VOLUME, DRY STANDARD CONDITIONS (Vmstd)

$$17.64 \times Vm \times Y \times (Pbar + \Delta H / 13.6) \times 1/Tm^{\circ}R = 32.647 \text{ dscf}$$

VOLUME OF WATER IN GAS SAMPLE, STANDARD CONDITIONS (Vwstd)

$$(Wi \times 0.04707) + (Ws \times 0.04715) = 1.931 \text{ scf}$$

PROPORTIONAL MOISTURE CONTENT OF GAS BY VOLUME (Bws)

$$\frac{Vwstd}{Vmstd + Vwstd} = 0.056 = 5.6 \% \text{ by volume}$$

GAS MOLECULAR WEIGHT, DRY BASIS (Md)

$$(0.44 \times CO_2\%) + (0.32 \times O_2\%) + (0.28 \times (100 - O_2\% - CO_2\%)) = 30.76 \text{ lb/lb-mole}$$

GAS MOLECULAR WEIGHT, WET BASIS (Ms)

$$(Md \times (1-Bws)) + (18 \times Bws) = 30.05 \text{ lb/lb-mole}$$

PITOT TUBE COEFFICIENT (Cp)

$$= 0.84$$

ABSOLUTE GAS PRESSURE (Ps)

$$Pbar + (\text{Static Pressure}/13.6) = 29.78 \text{ in. Hg}$$

GAS VELOCITY (Vs)

$$85.49 \times Cp \times \text{Square Root delta P} \times ((Ts^{\circ}R / (Ps \times Ms))^{\frac{1}{2}}) = 37.2 \text{ ft/sec.}$$

GAS VOLUME FLOW RATE (acf/m)

$$\text{Stack Area} \times Vs \times 60 = 61286.4 \text{ acfm}$$

GAS VOLUME FLOW RATE (scfm)

$$acf \times Tstd \times Ps / (Ts^{\circ}R \times Pstd) = 41155.9 \text{ scfm}$$

GAS VOLUME FLOW RATE (scfh)

$$scfm \times 60 = 2469353.3 \text{ scfh}$$

GAS VOLUME FLOW RATE (dscfm)

$$(1-Bws) \times acfm \times Tstd \times Ps / (Ts^{\circ}R \times Pstd) = 38857.8 \text{ dscfm}$$

GAS VOLUME FLOW RATE (dscfh)

$$dscfm \times 60 = 2331469.4 \text{ dscfh}$$



**Environmental Monitoring & Technologies, Inc.**

## EPA Methods 2-5 Moisture, Flow &amp; Particulate Calculation Summary

Company Rockwell Lime  
Location Manitowoc, WI  
Source Lime Kiln Baghouse Outlet  
Run # 1  
Date 11-24-98

<u>GAS SAMPLE VOLUME, DRY STANDARD CONDITIONS (Vmstd)</u>	=	32.647 dscf
<u>PROPORTIONAL MOISTURE CONTENT OF GAS BY VOLUME (Bws)</u>	=	0.056
<u>GAS VOLUME FLOW RATE, (dscfh)</u>	=	2331469.4 dscfh
<u>FRONT ½ PARTICULATE MASS, FILTER AND PROBE WASH (Mf)</u>	=	49.6 mg
<u>CONDENSIBLE PARTICULATE MATTER (CPM), INORGANIC MASS (Mi)</u>	=	52.7 mg
<u>CONDENSIBLE PARTICULATE MATTER (CPM), ORGANIC MASS (Mo)</u>	=	11.0 mg
<u>FRONT ½ PARTICULATE CONCENTRATION, (gr/dscf)</u> Mf x 0.001g/mg x 1/Vmstd x 15.43 gr/g	=	0.0234 gr/dscf
<u>INORGANIC CPM CONCENTRATION, (gr/dscf)</u> Mi x 0.001g/mg x 1/Vmstd x 15.43 gr/g	=	0.0249 gr/dscf
<u>ORGANIC CPM CONCENTRATION, (gr/dscf)</u> Mo x 0.001g/mg x 1/Vmstd x 15.43 gr/g	=	0.0052 gr/dscf
<u>TOTAL MEASURED PARTICULATE MATTER CONCENTRATION, (gr/dscf)</u>	=	0.0535 gr/dscf
<u>FRONT ½ PARTICULATE EMISSION RATE, (lb/hr)</u> 2.205E-06 lb/mg x Mf x dscfh x 1/Vmstd	=	7.8105 lb/hr
<u>INORGANIC CPM EMISSION RATE, (lb/hr)</u> .205E-06 lb/mg x Mi x dscfh x 1/Vmstd	=	8.2986 lb/hr
<u>ORGANIC CPM EMISSION RATE, (lb/hr)</u> 2.205E-06 lb/mg x Mo x dscfh x 1/Vmstd	=	1.7322 lb/hr
<u>TOTAL MEASURED PARTICULATE EMISSION RATE, (lb/hr)</u>	=	17.8413 lb/hr
<u>CALCULATION OF PERCENT ISOKINETIC VARIATION</u> 100 % x (0.09450 x Ts°R x Vmstd) / (Ps x Vs x An x minutes x (1-Bws))	=	90.1 %
Gas Temperature, Ts°R = 782.7	Gas Velocity, Vs = 37.2	
Absolute Gas Pressure, Ps = 29.78	1 - Bws = 0.944	
Area of Nozzle (sq.ft.), An = 0.0004276	minutes = 60	

